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ABSTRACT

This study examines the relationship between selected teacher and student verbal behaviors occuring during social science concept instruction and the residual class mean scores of third, fourth, and fifth grade students on a test of the social science concept specialization. Twenty pre-service teachers and two experienced teachers were the teacher subjects; 312 elementary school pupils participated in the study. Each teacher conducted two lessons with a randomly selected class on consecutive days. Instruction was conducted in a discussion mode and was audiotaped for later analysis. Three instruments were developed to record and quantify the teacher and student behaviors. Students were pretested two days prior to instruction and were posttested immediately following the second lesson. Findings indicated that students made greater gains in learning social science concepts when teachers adequately defined and gave examples of concepts, when concept instruction was relevant to instructional objectives, and when teachers expressed enthusiasm over the content of the lesson. Findings also implied that the more students verbally manipulate relevant concept dimensions, the stronger will be the achievement. It is suggested that further research on teacher behavior is necessary in order to build an empirical base from which theories on teaching may be derived. (Author/JK)

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Correlates of Teacher Effectiveness in Social Science Concept Instruction

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A paper presented at the National Council for the Social Studies College and University Faculty Association 1977 meeting held in Cincinnati, Ohio.

The basic problem on this study was to determine what relationships exist between selected teacher and student verbal behaviors occurring during social science concept instruction and the residual class mean gain scores of third, fourth, and fifth grade students on a test of the social science concept specialization. This was an exploratory, correlational investigation of naturally-occurring teacher and student behavior, with a micro-effectiveness focus on the teacher's role as an instructor of concepts.

Twenty pre-service teachers and two experienced teachers were the teacher subjects; three hundred twelve elementary school pupils participated in the study. The twenty-two teachers were provided with instructional objectives for two concept lessons and with substantive background information on the economic concept of specialization. Each teacher was assigned to a randomly-selected half of his/her own class. Children were pretested by the investigator two full days prior to instruction. The Student Test of Understanding of the Economic Concept Specialization (STUECS) was a thirty-eight item, true-false instrument which tapped recognition of examples and non-examples of the three forms of specialization -- occupational, geographical, and technological; recognition of statements of relationships between the concepts of specialization, interdependence, and exchange; and recognition of problematic aspects of specialization. Content validation by a panel of economic educators, concept-learning educators, and elementary school social studies educators supported the contention that the test items were congruent with the instructional objectives and with economic knowledge. The test-retest reliability coefficient for STUECS for an uninstructed group was .76.

Each teacher conducted two forty-five minute lessons with the randomly-assigned class-half; lessons occurred on consecutive days. Instruction was to be conducted primarily in a discussion mode and was audio-taped for later analysis. Students were posttested by the investigator immediately following the second lesson.

Teacher and student process variables were derived from previous process-product research and from laboratory research on concept learning. Teacher process variables represented substantive, semantic, and strategic elements of the teacher's verbal concept instructional behavior. Student process variables represented (a) the student's response to the teacher's low or high order question; (b) the student's response to the teacher requests for concept definitions or concept examples; and (c) student freely-initiated statements or questions.

The investigator developed three instruments to record and quantify the teacher and student behaviors. Low inference as well as high inference variables were examined.

The statistical unit representing teacher effectiveness of concept instruction was the residual class mean gain score. Pearson product moment correlation coefficients determined the strength of the relationships between teacher and student process variables and the criterion measure. Significant low inference teacher process variables included: giving concept definitions; giving positive concept examples; reviewing the main ideas; explicitly including more of the implied generalizations (or adequately covering the content); and explicitly including more of the relevant concept labels. Significant high inference teacher variables were accuracy of definition and example-giving; relevance of behavior to the instructional objectives; maintaining a balance of concrete-abstract terminology; and expressing enthusiasm and interest over the content of the lesson.

While none of the student process variables related significantly with the student achievement measure, several interesting relationships occurred. Four variables represented the student's responses to the teacher's request for a concept example or a concept definition; the student gives a correct concept example, gives an incorrect concept example, gives a correct concept definition and gives an incorrect concept definition. Each of these variables was a positive correlate of student achievement. This finding implies that the more students actually verbally manipulate relevant concept dimensions, despite the incorrectness/correctness of the verbal response, the stronger will be the achievement. In addition, two students freely-initiated behaviors related positively with the criterion measure: the student expresses misunderstanding and the student challenges the teacher substantively. These academically on task student behaviors indicate the student's involvement with the topic of the lesson. Previous process-product findings indicate that all student initiated

comments, both academic and non-academic, are inverse correlates of student gain. The results of this study indicate that the student initiated variables warrant further research attention.

This study contributes to the growing body of research which attempts to relate teacher behaviors to student achievement. Such research is an essential prelude to experimental studies, wherein promising variables may be more precisely examined. Correlational studies aid in the identification of relevant behavioral variables in the teaching process. Such empirical knowledge is critical to the construction of viable teacher education programs which aim to be competency-based.

The results of this study describe teacher behaviors which were associated with greater gains in student learning of a social science concept. These associations have been utilized to form a basis for the generation of hypotheses which should be tested in subsequent experimental investigations. The following hypotheses are derived from the results of this study.

1. As teacher behavior during concept instruction becomes more structured and task relevant, student learning will increase. That is, as teachers give more concept definitions, give positive concept examples, and review the main ideas of the lesson, student achievement of concept tasks will increase.

2. As the substantive aspect of teacher behavior during concept instruction becomes more adequate, accurate, and relevant to the instructional objectives, student achievement on concept tasks will increase.

3. As teachers include more of the relevant knowledge generalizations and more of the relevant concept labels during concept instruction, student concept learning will increase.

4. As teachers express more enthusiasm and interest over the content of the concept lesson, student achievement will increase.

At present, empirical evidence which relates teacher behavior with student achievement is minimal. Yet teacher educators, teacher evaluators, and the developers of teacher protocol materials often must make policy decisions which assume causal relationships between select teacher performances and student outcomes. Consequently, the products, programs, and decisions arising from this assumption lack theoretical frameworks and empirical foundations. Further research on teacher behavior such as that suggested here is necessary in order to build a sound empirical base from which theories on teaching may be derived.

**For more complete information on this study, the interested reader is referred to:

--Beverly Jeanne Armento, "Teacher Behaviors Related to Student Achievement on a Social Science Concept Test," Journal of Teacher Education, vol. 28, No. 2, March-April 1977, p. 46-52.

--Beverly Jeanne Armento, "Selected Correlates of Effective Teacher Behavior During Concept Instruction: Their Design, Utility and Limitations," A paper presented at the Annual Meeting of the American Educational Research Association, April, 1977, New York City, ED 137 290; SP010 933; paper also available from author upon request.

TABLE 1. MEANS AND STANDARD DEVIATIONS OF STUDENT TEST OF UNDERSTANDING OF THE ECONOMIC CONCEPT SPECIALIZATION PRETEST AND POSTTEST SCORES AND RESIDUAL CLASS MEAN GAIN SCORES (n = 22 classrooms)

Class-room*	Pretest Mean	Pretest Standard Deviation	Posttest Mean	Posttest Standard Deviation	Residual Class Mean Gain Score	Standard Deviation	Number of Children in Group
5-01	25.78	4.29	30.33	4.69	+2.4757	2.13	9
3-02	24.60	3.13	27.40	5.06	+0.4213	3.68	10
4-03	28.44	3.50	29.11	4.14	-0.7365	4.00	9
3-04	25.25	2.05	23.50	3.46	-3.9638	2.54	8
3-05	23.45	2.38	24.36	3.50	-1.7603	2.45	11
5-06	27.62	4.37	29.85	5.65	+0.6172	4.24	13
4-07	26.93	4.57	28.93	5.87	+0.2134	3.79	15
5-08	28.79	4.49	28.86	5.36	-1.2451	3.84	14
5-09	31.91	3.11	33.55	3.17	+1.1124	2.08	11
5-10	26.50	4.33	29.00	3.92	+0.6034	1.69	14
3-11	24.75	4.49	26.83	3.71	-0.2573	3.79	12
3-12	24.36	4.50	27.36	2.50	+0.5613	3.88	11
4-13	29.85	3.98	32.54	3.80	+1.6448	3.63	13
5-14	32.25	2.96	32.50	2.15	-0.1875	1.59	12
4-15	26.64	5.60	30.29	3.34	+1.7825	2.59	14
3-16	25.18	4.64	26.36	4.97	-1.0493	3.08	11
5-17	31.07	3.53	32.53	2.90	+0.7289	2.67	15
3-18	23.92	4.96	28.08	5.11	+1.6145	3.72	12
3-19	26.36	4.20	25.91	4.44	-2.3857	3.05	11
5-20	28.80	3.23	30.33	2.77	+0.2204	2.66	15
5-21	33.64	3.82	35.07	2.16	+1.3446	2.88	14
5-22	33.70	1.77	34.20	2.04	+0.4305	1.68	10

*The first numeral in the classroom code denotes grade level.

TABLE 2. FREQUENCY DATA FOR STUDENT PROCESS BEHAVIORS (n = 22 classes).

Variable Name	Mean	Mode	Median	Range	Standard Deviation
Gives correct answer to low/high question	56.05	25.00	47.50	70.00	20.93
Gives logical answer but not congruent with teacher's question	1.86	1.00	1.39	7.00	1.61
Gives correct answer but teacher does not accept as correct	3.73	5.00	3.25	10.00	2.55
Gives incorrect answer	4.96	5.00	4.70	14.00	3.71
Gives correct concept example	4.14	0.00	2.50	20.00	4.74
Gives incorrect concept example	.41	0.00	.29	2.00	.59
Gives correct concept definition	1.55	1.00	1.13	7.00	1.74
Gives incorrect concept definition	.59	0.00	.42	2.00	.73
Expresses misunderstanding	1.36	0.00	1.17	4.00	1.29
Challenges teacher	3.05	1.00	2.17	11.00	2.73
Offers off-task talk	31.73	1.00	8.50	156.00	42.67
Other, substantive digressions	18.36	7.00	13.50	56.00	14.09

TABLE 3. FREQUENCY DATA FOR LOW-INFERENCE TEACHER PROCESS VARIABLES (n = 22)

Variable Name	Mean	Mode	Median	Range	Standard Deviation
Gives definition	2.55	2.00	2.07	11.00	2.60
Asks for definition	2.55	1.00	1.40	6.00	2.15
Gives positive examples	6.41	3.00	5.00	25.00	6.04
Gives negative examples	.36	0.00	.29	1.00	.49
Asks for positive examples	1.27	1.00	1.10	4.00	1.08
Asks for negative examples	-------	----Does	not occur	----------	----------
Signals topic shift	4.82	4.00	4.30	11.00	3.13
Reviews, summarizes	5.18	5.00	4.83	8.00	2.34
Answers, explains	8.73	5.00	6.17	23.00	6.64
Asks low order question	41.59	24.00	37.50	75.00	19.11
Asks high order question	7.27	3.00	5.50	26.00	6.13
Repeats question	2.59	1.00	1.83	7.00	2.04
Rephrases question	4.14	3.00	3.75	9.00	2.30
Total, content shifts	13.82	7.00	12.50	18.00	5.67
Asks pairs of questions	8.09	2.00	6.50	26.00	6.57
Off-task behavior	10.96	1.00	5.50	62.00	14.85
Other, digressions	1.50	1.00	1.28	5.00	1.26
Gives knowledge generalizations	12.09	15.00	12.75	10.00	2.83
Gives concept labels	5.91	7.00	6.50	6.00	1.90

TABLE 4. PEARSON PRODUCT MOMENT CORRELATION COEFFICIENTS FOR STUDENT PROCESS VARIABLES AND STUDENT PRODUCT MEASURE (n = 22 classes)

Student Process Variable	Correlation
Answers low or high order question correctly	-.221
Gives answer which does not match teacher's question	.130
Gives correct answer which teacher does not accept	-.278
Gives incorrect answer	-.227
Gives correct concept example	.209
Gives incorrect concept example	.261
Gives correct concept definition	.259
Gives incorrect concept definition	.201
Expresses misunderstanding, asks for clarification, repetition	.136
Substantively challenges teacher	.311
Offers irrelevant, off-task talk	-.211
Makes a contribution tangentially related to lesson	-.033

Note: None of the student process variables related at a .05 level of significance with the student product measure.

TABLE 5. PEARSON PRODUCT MOMENT CORRELATION COEFFICIENTS FOR HIGH INFERENCE TEACHER PROCESS VARIABLES AND CLASS RESIDUAL MEAN GAIN SCORES

Teacher Process Variables	Correlation	Level of Significance
Accuracy of concept definitions	.326	
Accuracy of concept examples	.376	.04*
Relevance of behavior to objectives	.370	.04*
Balance between concrete and abstract terminology	.381	.04*
Uses complete sentences and correct pronouns	.274	
Expresses interest and enthusiasm over content of lesson	.478	.01**
On-task, low noise behavior	.279	

*$p \leq .05$
**$p \leq .01$

TABLE 6. PEARSON PRODUCT MOMENT CORRELATION COEFFICIENTS FOR LOW INFERENCE TEACHER PROCESS VARIABLES AND CLASS RESIDUAL MEAN GAIN SCORES (n = 27)

Teacher Process Variables	Correlation	Level of Significance
Gives concept definition	.426	.02*
Asks for concept definition	.190	
Gives positive concept example	.497	.009**
Gives negative concept example	.225	
Asks for positive concept example	.177	
Asks for negative concept example	Does not occur	
Signals a topic change	-.008	
Reviews, summarizes main ideas	.376	.04*
Asks lower order questions	-.098	
Asks higher order questions	-.047	
Repeats question after student response	-.309	
Rephrases question after student response	-.257	
Signals and changes the topic simultaneously	-.171	
Uses review-signal-shift pattern	.122	
Changes topic with a low order question	-.301	
Changes topic with a high order question	.162	
Asks pairs of questions	-.013	
Tells students to stop irrelevant behavior	-.050	
Other, including substantive digressions	-.043	
Adequacy of content coverage	.456	.01**
Adequacy of concept label coverage	.528	.006**

*p ≤ .05

**p ≤ .01